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ELECTROTECHNICAL VOCABULARY

PART XXV RADIOLOCATION AND RADIO-NAVIGATION

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
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PART XXV RADIOLOCATION AND RADIO-NAVIGATION

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Indian Standard

ELECTROTECHNICAL VOCABULARY

PART XXV RADIOLOCATION AND RADIO-NAVIGATION

0. FOREWORD

0.1 This Indian Standard (Part XXV) was adopted by the Indian Standards Institution on 26 October 1967, after the draft finalized by the Electrotechnical Standards Sectional Committee in consultation with the Electronic Equipment Sectional Committee had been approved by the Electrotechnical Division Council.

0.2 A series of standards has been prepared with a view to bringing together the terms relating to radio communications covering different aspects, such as circuits, radiowave propagation, aerials, transmitting and receiving equipment, radio telegraphy and mobile radio, sound and television broadcasting, radiolocation and radio-navigation, etc. This standard deals with the terms regarding radiolocation and radio-navigation.

0.3 The definitions contained in this standard have been drawn up with the object of striking a correct balance between absolute precision and simplicity. The principal object of the standard is to provide definitions which are sufficiently clear so that each term is understood with the same meaning by all electrical engineers and it does not, therefore, constitute a treatise on electrical engineering. Thus, it may sometimes be felt that the definitions are not sufficiently precise, do not include all cases, do not take account of certain exceptions or are not identical with those which may be found in other publications designed with other objects and for other readers. Such imperfections, which will be eliminated as far as possible in later editions, are inevitable and should be accepted in the interest of simplicity and clarity.

0.4 This standard is one of a series of Indian Standards on electrotechnical vocabulary.

0.5 This standard largely follows IEC Draft Publication 50(60), Group 60 'Radio communications' brought out by the International Electrotechnical Commission. Assistance has also been derived from B.S. 204 : 1960 'Glossary of terms used in telecommunication (including radio) and electronics' issued by the British Standards Institution.

1. SCOPE

1.1 This standard (Part XXV) covers definitions of terms used in the field of radiolocation and radio-navigation.

2. GENERAL

2.1 **Radiolocation/Radio Determination** — Determination of relative direction, position or motion of an object, or its detection, by means of the propagation characteristics of radio waves.

NOTE — The characteristics generally employed are those which approximate constant velocity and/or rectilinearity.

2.2 **Radio Warning/Radio Detection** — The detection of the presence of an object by radiolocation without precise determination of its position.

NOTE — This function of radio is rarely used apart from others but must be separately defined.

2.3 **Radio-Doppler** — The direct determination of the radial component of the relative velocity of an object by an observed radio-frequency change due to such velocity.

2.4 **Radio-Goniometry** — Radiolocation in which only the direction of a distant object is determined by means of its radio emissions, whether independent, reflected, or automatically re-transmitted on the same or other wavelengths.

2.5 **Direction-Finding** — The operation of determining the bearing of a transmitter, or its angle of elevation, or both, by observation of its own independent transmissions.

2.6 **Radio Range-Finding** — Radiolocation in which the distance of an object is determined by means of its radio emission, whether independent, reflected or automatically retransmitted on the same or other wavelength.

2.7 **Angular Resolution** — Of a direction-finder or radar equipment. The ability to distinguish between two objects solely by the measurement of angles; generally expressed in terms of the minimum angle by which the objects at the same distance must be spaced to be separately distinguishable.

2.8 **Range Resolution/Range Discrimination** — Minimum distance by which objects in the same direction must be departed from each other so as to be separately distinguishable.

2.9 **Volumetric Coverage/Volume Coverage/Coverage** — In the air, that region of space within which a radio-navigation equipment, or a group of such equipment, provides a usable signal.

2.10 **Horizontal Coverage/Azimuth Coverage** -- The area of intersection of a given horizontal plane with the volumetric coverage.

2.11 Vertical Coverage — In a given vertical plane the area over which the navigation aid provides a usable signal.

2.12 Coverage Diagram — A contour enclosing the coverage.

2.13 Course Alignment (in Radio Range) — The actual magnetic azimuth of a course after averaging the changes in course which are classified as scalloping or roughness or bend.

2.14 Course Bend — Departure of the course from a straight line.

2.15 Course Roughness — Rapid irregulator excursions of the course.

2.16 Course Scalloping — Rhythmic excursions of the course.

2.17 Minimum Reception Altitude (MRA) (In Omni Range) — The lowest altitude over a point or along a route at which a signal providing reliable course line information can be received.

2.18 Polarization Effect (in Omni Range and in Instrument Landing System) — Inconsistent course deviation indications with aircraft altitude changes, caused by the existence of undesired signal polarization.

3. DIRECTION FINDING

3.1 Relative Bearing/Direct Bearing/Bearing — Of a given point P from the point of observation O (or of a directed straight line OP) : the angle between a reference direction in the horizontal plane at O and the projection of OP on this plane.

Note 1 — The sign convention should be specified, that is, whether clockwise direction is positive as a normal navigational usage.

Note 2 — In navigational usage the term 'relative bearing' is limited to bearings related to the ship's head.

3.2 True Bearing/Azimuth — The bearing for which the reference direction at the point of observation is true north. It is measured in degrees (0 to 360) clockwise from true north.

3.3 Long-Path Bearing — Of a distant point. The angle differing from the bearing of the point of 180°.

Note — This term is used in connection with propagation around the earth by way of the longer arc of the great circle containing the transmitter and receiver.

3.4 Short-Path Bearing — Of a distant point. A term used for the bearing of a distant point when it is desired to distinguish it from the long-path bearing.

3.5 Reciprocal Bearing

a) Of a distant point. The angle differing from the bearing of the point by 180°.

b) As observed on a direction-finder in which 180° ambiguity exists. The reading of the bearing scale differing by approximately 180° from the direct bearing.

c) As used by cartographers. The bearing of the observer's station from the distant station.

NOTE — Bearings obtained by observing the directional content of directional beacon transmissions (without recourse to a direction-finder), at the observing point, are ' reciprocal bearings ' in the sense of (c). In these cases the bearing may differ from that defined in (a) except at short distances.

3.6 Magnetic Bearing — The bearing for which the reference direction at the point of observation is magnetic north. It is measured in degrees (0 to 360) clockwise from magnetic north.

3.7 Angle of Elevation/Angle of Sight — The angle between the line joining the object and the observer and the projection of this line on the horizontal plane passing through the observer. The angle is counted as positive when the object is above that horizontal plane, and vice versa.

3.8 Observed Bearing — The reading of the bearing scale of the direction-finder.

3.9 Bearing Determination — Taking a bearing.

3.10 Error in Bearing — The angular difference, expressed algebraically, between the observed bearing and the corresponding true bearing.

NOTE — This error is in general the sum of two terms, a systematic error that can be corrected, and an unknown random error.

3.11 Bearing Correction — The total of those corrections associated with a given instrument and a given site which are determinable by a calibration process. A correction which is *added* to an observed bearing is taken as *positive*.

3.12 Corrected Bearing — The bearing obtained when the bearing correction has been applied to the observed bearing.

3.13 Instrumental Error — In the reception of the single plane wave an error due to the properties of the direction-finder.

NOTE — Polarization error other than that due to specific features of the site (for example, inclined conductors) is a form of instrumental error.

3.14 Pointer Centring Error — Instrumental error due to a fault in the centring of the needle or other angle indicator.

3.15 Spacing Error — Instrumental error other than polarization error, due to the variation with frequency of the spacing of the aerials in wavelengths.

NOTE — For a four-aerial Adcock system this error is of octantal form with respect to azimuth, increasing with frequency and aerial spacing, and decreasing with angle of elevation.

3.16 Residual Spacing Error — The spacing error, for angles of elevation other than zero, after correcting for the spacing error at zero angle of elevation.

3.17 Site Error — An error due to some feature or features of a direction-finding site.

3.18 Site Error Susceptibility — Some specified quantitative description of the susceptibility of a given class of direction-finder to site error.

3.19 Re-Radiation Error — A form of site error caused by re-radiation from features, such as telephone wires, communication aerials and mast stays.

3.20 Loop Alignment Error — Inaccurate alignment of the loop aerial system with respect to the datum line. Usually, in aircraft and ships, inaccurate alignment with respect to the fore and aft line.

3.21 Inclination Error — A measuring error due to a fault in the orientation of the axis of rotation of a rotating direction-finder.

3.22 Field Alignment Error — A form of site error caused by the direction-finder aerial system not being mounted on the centre line of the ship or aircraft or caused by non-symmetry in the structure of the vessel.

3.23 Installation Error — The resultant of the instrumental and site errors which frequently cannot be separately distinguished.

3.24 Semicircular, Quadrantal and Octantal Error — An instrumental error which disappears twice (four times) (eight times) per complete rotation of a goniometer.

3.25 Error Curve — A curve applicable to a particular direction-finder and which shows the systematic installation errors as a function of some specified variable.

Note — Use is commonly made of a family of such error curves as a function of true bearing with frequency as the parameter.

3.26 Correction Curve — A curve applicable to a particular direction-finder and which shows the correction required to the observed bearing, as a function of that bearing, to eliminate the systematic installation errors.

3.27 Bearing Calibration — Of a direction-finder. The determination of bearing corrections by observations on one or more transmitters of known bearings.

3.28 Polarization Error — In bearing. An error, in an observed bearing, which arises from the state of polarization of the received waves.

3.29 Total Polarization Error — In bearing, and for a specified direction of incidence and a specified ratio of the amplitudes of the vertically and horizontally polarized components of the incident wave: the maximum value of the polarization error with respect to variation of the phase difference between the vertically and horizontally polarized components.

NOTE — The term is applicable only to direction-finders designed for operation with vertically polarized waves only, or with horizontally polarized waves only.

3.30 Aeroplane Effect — A type of error which may occur in the observed bearing of a transmitter carried by an aircraft. It is a form of polarization error and varies with the aspect of the aircraft as viewed from the direction-finder.

3.31 Night Effect/Night Error — A polarization error caused by variations in polarization exhibited throughout the night at certain frequencies resulting from the reception of waves reflected from the ionosphere.

3.32 Standard-Wave Error — The total polarization error produced by a plane wave incident at an angle of elevation of 45° and having equal vertically and horizontally polarized components.

NOTE — As a criterion of performance the term is not appropriate to direction-finders employing elevated aerial systems.

3.33 Propagation Error — An error caused by a deformation or deviation of the wave front as a result of propagation phenomena.

3.34 Ionospheric-Path Error — An error in bearing due wholly to some feature or features of the ionosphere, for example, reflection from a tilted layer, or scattering.

3.35 Lateral Deviation — The deviation of a ray from the great-circle plane containing the point of observation and the transmitter.

NOTE — Such deviation can occur, for example, as a result of reflection from a tilted ionospheric layer.

3.36 Lateral Deviation Error — The error in bearing at the point of observation due to lateral deviation.

3.37 Coastal Refraction — Change of direction of propagation of a radio wave on crossing a coast line.

3.38 Wave-Interference Error — In bearing. An error arising from the simultaneous reception of two or more waves arriving in different directions from a single transmitter.

3.39 Bearing Oscillation — Variation in observed bearing from one side to the other of its mean value, mainly caused by wave-interference.

3.40 Flatness of Bearing (Due to Instrumental Imperfections) — The angular interval comprising the bearing observations near the correct value, between which the variation in intensity of the signal at the output of the receiver is too small to be detected when the goniometer is balanced.

3.41 Swing — The angle containing the direction of a bearing observation and bounded by limits within which the variation of the intensity of the signal is too slight to be detected, or the signal is marked by noise.

3.42 Swinging — The operation of passing through a number of swings in a bearing or angle of elevation.

3.43 Oscillation Error Uncertainty — The error representing the uncertainty in the mean of the observed bearings mainly due to bearing oscillations.

3.44 Spread of Bearings or Range of Bearings — The angular range of all the corrected bearings given by a series of bearing observation of a given fixed transmitter.

3.45 Swing Error — An error caused by the uncertainty in the determination of the limits of the swing.

3.46 Source Error/Transmitter Site Error — The error, other than polarization error, due solely to the transmitting system and its immediate surroundings.

3.47 Distant Site Error/Inter-Site Error — An error of bearing, other than source error, due to scattering or lateral deviation by irregularities in, or obstacles on, the earth's surface outside the site of the direction-finder.

Note — In ground-wave transmission, such an error may be called 'ground-path error'.

3.48 Figure-of-Eight Diagram — A polar diagram depicting the directional effect of a direction-finder, the diagram being represented in its theoretically perfect form by two equal circles tangentially disposed at the origin.

3.49 Figure-of-Eight Reception — Reception in which the polar diagram of the magnitude of the received voltage plotted against bearing is a figure of eight.

3.50 Cardioid Diagram/Heart Shape Diagram — A polar diagram depicting the directional effect of a direction-finder, the diagram being represented in its theoretically perfect form by a cardioid having its cusp at the origin.

3.51 Cardioid Reception/Heart Shape Reception — Reception in which the polar diagram of the magnitude of the received voltage plotted against bearing is cardioidal in form.

3.52 Sense Finding — The operation of eliminating the 180° ambiguity from the bearing indication given by some types of direction-finder.

3.53 Pick-Up Factor — Of a specified aerial or combination of aerials connected to a receiver of a direction finder. The ratio of the receiver input voltage to the field strength of the received wave taking into account the receiver input impedance and any variable components between the aerial and the receiver, the direction and polarization of the wave being specified. This quantity is expressed in metres.

3.54 Pick-Up Ratio — The ratio of the pick-up factors corresponding to two specified plane polarizations of a wave of specified direction of arrival.

3.55 Balancing (of a Direction-Finder) — The process of adjusting the electrical symmetry of the aerial and other parts of the direction-finder, over the whole frequency range of the equipment.

3.56 Balance Ratio — In figure of eight reception. The ratio of the maximum and minimum received voltages in the polar diagram of a direction-finder.

3.57 Antenna Effect — Impairment of definition of, and/or error in, the bearing observed by means of a receiving system which is designed to be electrically symmetrical (for example, a loop aerial direction-finder) due to imperfection of electrical symmetry.

NOTE — Antenna Effect is usually limited to the vertical aerial effect in a loop aerial.

3.58 Compensation — The process of effecting the maximum possible reduction in antenna effect.

3.59 Calibration Adjustment — The process comprising the adjustment, balancing and possibly the compensation of a direction-finder, followed by the preparation of calibration curves.

3.60 Stray Pick-Up — In direction-finding. Reception of signals which affect the performance of the facility by portions of the apparatus other than the aerials.

3.61 Minimum Clearing/Zero Clearing — The process of artificially improving the definition of the observed bearing, for example, by neutralizing antenna effect.

3.62 Aerial Spacing/Spacing — The distance between the centres of a specified pair of aerials in a spaced aerial direction-finder; often expressed in terms of the wavelength in use.

3.63 Search Condition — A condition of a direction-finder in which the aerial, by a modification to the connections, is rendered omnidirectional.

3.64 Angular Spacing — Of spaced aerials. Expressed in radians, 2π times the ratio of the aerial spacing to the wavelength in use.

3.65 Direction-Finder — A complete receiving equipment, with aerials and associated circuits, used for direction-finding.

3.66 Direction-Finding Network — A number of direction-finders separated from each other by sufficiently great distances for the position of a transmitter to be determined from simultaneous observations at each of the direction-finders.

3.67 Rotating Aerial Direction-Finder — A direction-finder whose action depends on the rotation of the aerial system.

3.68 Rotating Loop Direction-Finder — A direction-finder whose action depends on the rotation of a loop or frame aerial.

3.69 Compensated Loop Direction-Finder — A loop-aerial direction-finder for bearing determination, incorporating a second aerial system designed to reduce polarization error.

3.70 Site Corrected Loop Direction-Finder — A loop-aerial direction finder for bearing determination, designed to reduce the error due to neighbouring conductors under given installation conditions.

3.71 Spaced-Aerial Direction-Finder — A direction-finder whose action depends on the comparison of signals received by two or more similar aerials with their centres separated in space.

3.72 Circular Aerial Direction-Finder — A direction-finder with a sufficiently large number of spaced aerials spread round the circumference of a circle.

NOTE — This type of direction-finder is described as 'evenly spaced' when the individual aerials are uniformly arranged round the circle and 'uneven' if they are not arranged uniformly.

3.73 Rotating Spaced-Loop Direction-Finder — A spaced-aerial direction-finder comprising two identical loops disposed at the extremities of a rotating arm.

3.74 Spaced-Loop Direction-Finder — A spaced-aerial direction-finder in which the separated aerials are loop aerials.

3.75 Fixed Aerial Direction-Finder/Fixed Direction-Finder — A direction finder whose action does not require rotation of the aerial system.

3.76 Bellini Tosi Direction-Finder/Crossed-Loop Direction-Finder with Goniometer — A fixed aerial direction-finder for bearing determination embodying orthogonal loop aerials coupled to a radiogoniometer.

3.77 Adcock Direction-Finder — A form of spaced aerial direction-finder for bearing determination, embodying one or more pairs of spaced vertical aerials, the members of each pair being differentially interconnected by transmission lines.

NOTE — The object of the design is to minimize response of the system to the horizontally-polarized component of the electric field.

3.78 'H' Type Adcock Direction-Finder/Elevated Adcock Direction-Finder — An Adcock direction-finder embodying spaced vertical dipole aerials.

3.79 Rotating 'H' Adcock Direction-Finder — An 'H' type Adcock direction-finder having a dipole aerial at each end of a rotating arm.

3.80 U-Type Adcock Direction-Finder — An Adcock direction-finder in which the aerials of each pair are connected by buried and/or shielded transmission lines from their lower ends.

3.81 Balanced Adcock Direction-Finder — An Adcock direction-finder in which the aerial-earth circuits are made electrically symmetrical about the coupling to the transmission lines by the insertion of suitable impedances in the aerial circuits.

3.82 Manual Direction-Finder — A direction-finder with a hand-controlled measuring device.

3.83 Aural Direction-Finder — A direction-finder based on the observation of minimum sound intensity or on the comparison of two sounds.

3.84 Switched Beam Direction-Finder — A direction-finder based on observations of the equality of signals received in two different positions of the polar diagram.

3.85 Robinson Direction-Finder — A rotating direction-finder with a loop aerial provided and auxiliary loop at right angles, with switching arrangements to facilitate the taking of bearings without reducing the received signal to inaudibility. The two loops are connected in series and rotated together until the signal output does not change when the connections of the auxiliary loop are reversed.

3.86 Automatic Direction-Finder — A direction-finder in which the bearing (with or without sense) or angle of elevation, or both is determined automatically.

Note — The automatic radio compass is an example of an automatic direction-finder.

3.87 Cathode-Ray Direction-Finder (CRDF) — A direction-finder, often automatic in which the bearing or angle of elevation (or both) is displayed on the screen of the cathode-ray tube or tubes.

3.88 Double Channel Cathode-Ray Direction-Finder — A cathode-ray direction-finder comprising two pairs of aerials at right angles, the signals from one pair being applied to the X plates and from the other to the Y plates of the tube, by way of two balanced receivers having identical characteristics. The balancing of the receiver is usually done manually.

3.89 Automatic Double Channel CRDF — A double channel CRDF with an automatic balancing device.

3.90 Wide-Aperture Direction-Finder — A direction-finder in which the arriving wave front is sampled simultaneously (or nearly so) by an array of aerials extending over a distance comparable to or greater than one wavelength.

3.91 Radiogoniometer — An instrument which, when coupled to a suitable fixed aerial system, enables the bearing of incident waves to be determined by rotation of a movable part.

3.92 Search Coil — Of an inductive radiogoniometer. A rotatable coil, forming the essential moving part of the radiogoniometer and coupled to the field coils which induce voltages in it. The search coil is normally connected to a receiver.

3.93 Rotor (of a Radiogoniometer) — The moving part of the goniometer assembly.

3.94 Field Coils (of an Inductive Radiogoniometer) — The fixed coils (usually at right angles) which are connected to the aerial system.

3.95 Stator (of a Radiogoniometer) — The fixed part of the goniometer assembly.

4. RADAR

4.1 Radar — The use of radio waves, reflected or automatically retransmitted, to gain information concerning a distant object. The measurement of range is usually included.

4.2 Primary Radar — Radar in which the object only reflects the incident radiation.

4.3 Secondary Radar — Radar in which the responding object is caused automatically to retransmit on the same or other wavelength. The delay in evoking the retransmission shall be sufficiently short and precise for the range to be measurable.

4.4 Continuous-Wave Radar/CW Radar — A type of radar which uses continuous wave transmission.

4.5 Pulse-Modulated Radar/Pulse Radar — A form of radar in which the transmitted radiation consists of a series of discrete pulses. Usually the radio frequency is substantially the same in all the pulses.

4.6 Frequency-Modulated Radar/FM Radar — A form of radar in which the radiated wave is frequency-modulated.

Note — The frequency of an echo is compared with the frequency of the transmitted wave at the instant of reception thus enabling the range to be measured.

4.7 Doppler Radar — A form of radar in which the radio Doppler effect is used to determine the radial component of the velocity of a target relative to the radar system.

4.8 Continuous-Wave Doppler Radar — A form of doppler radar in which the transmitted radiation is a continuous oscillation.

4.9 Pulse-Doppler Radar — A doppler radar in which the transmitted radiation is in the form of pulses (usually coherent).

4.10 Coherent-Pulse Radar — A form of pulse-modulated radar in which the radio frequency oscillations in recurrent pulses bear a constant phase-relation to those of a continuous oscillation.

4.11 Moving-Target Indication Radar/MTI Radar — A form of radar where means are provided for partially or wholly suppressing the appearance of stationary objects on the display.

Note — The term MTI is sometimes extended to radar systems which discriminate against targets in a predetermined state of uniform motion relative to the system.

4.12 IFF — A recognition system using secondary radar.

Note — The letters 'IFF' stand for 'Identification Friend or Foe', for which purpose the system was originally developed.

4.13 Blip — A momentary deflection or change of intensity, on a cathode-ray tube display, for example, produced by the signal from a responsor.

Note 1 — In IFF technique this is referred to as a response.

Note 2 — The term is also used to refer generally to any deflection observed on a radar display.

4.14 Gap Coding — Subdividing the response of a transponder into long and short groups of pulses (like the Morse code), for recognition purposes.

4.15 Width Coding/Duration Coding — Modifying the duration of the pulses emitted from the transponder in accordance with a pre-arranged code for recognition in the display.

4.16 *Chopping or Chopped Response* — Of a transponder. Rapid on-off switching of the transponder for recognition purposes.

4.17 Search — To seek information about target in a region.

Note — This term was formerly restricted to manual variation of the beam direction.

4.18 Range Search — A systematic search within a predetermined but usually variable portion of the range scale.

4.19 Scan — Of a radar aerial. Systematic variation of the beam direction for search or angle tracking.

4.20 Mechanical Scanning — Scanning effected by moving all or part of the aerial.

4.21 Electrical Scanning — Scanning in which the required variations in beam direction are produced by variations in phase and/or amplitude of the currents in the elementary aerials.

NOTE — This technique is also used in direction-finding.

4.22 Sector Scanning — Scanning through a limited plane angle about any desired axis.

4.23 Conical Scanning — Scanning in which the axis of the beam generates a cone.

NOTE — Conical scanning is generally employed to obtain improved angular accuracy by comparison of the signal amplitudes at various points in the cycle.

4.24 Automatic Range, Bearing or Elevation Measurement — The automatic determination of range, bearing, or angle of elevation of an object by a mechanism actuated by the echo.

4.25 Automatic Aiming/Angle Tracking — A system in which a mechanism controlled by the echo automatically keeps the radar beam pointing at an object moving relative to the radar set.

4.26 Automatic Following — Automatic aiming with the addition of automatic radar range measurement.

NOTE — The use of the term 'automatic following' to mean 'automatic aiming' is deprecated.

4.27 Instantaneous Target Detection — A method of detecting the position of a target by comparing signals received simultaneously by several elements of the aerial, at least two of which form the angular co-ordinator.

4.28 Static Split — A method of detecting the position of a target by simultaneous comparison of signals corresponding to two or more beam directions differing slightly from the direction of the target.

NOTE — This technique is also used in direction-finding.

4.29 Beam Switching — A method of determining the direction of a target by successive comparison of the signals corresponding to two or more beam directions differing slightly from the direction of the target. The motion of the beam may be either (a) continuous and periodic, or (b) discontinuous.

4.30 Echo Matching — In beam-switching. Turning the aerial system until the two echoes corresponding with the two directions of the beam are equal.

4.31 Window (in Radar) — Thin strips of metal which may be dispensed from an aircraft to provide radar echoes.

4.32 Railings — Lines, normal to the time-base on a range-amplitude display, produced by a particular type of jamming.

4.33 Radar Camouflage — The art of concealing the presence or the nature of an object from radar detection.

Note — One method is the use of coverings or surfaces which considerably reduce the radio energy reflected towards the radar set.

4.34 Radar Set — A complete installation for radar purposes.

Note — The word 'radar' can equally be applied to the equipment (*see* above) and to the function (*see* 4.1).

4.35 Air-Interception Radar (AI) — An airborne radar used for searching for and tracking other aircraft.

4.36 Ground-Controlled Interception (GCI) — In aviation. The technique of directing an aircraft towards another from a ground radar, both being observed on the same display. The information is transmitted to the aircraft by radio.

4.37 V-Beam System — A radar system employing an aerial arrangement in which two fan-shaped beams, one vertical and the other inclined, intersect at ground level. In the V-beam system of measuring elevation, the beam aerial system rotates continuously about a vertical axis. The time elapsing between the receipt of echoes on the two beams from an object is a measure of its elevation.

4.38 Radar Range Finder — A radar for measuring range only.

4.39 Transponder — A component of a secondary radar system which receives pulses from a radar set or interrogator and, in response to the received pulse, transmits a pulse or sequence of pulses to enable the craft or beacon incorporating the transponder to be recognized by the interrogating station.

4.40 Interrogator — A pulse transmitter used exclusively for exciting a transponder.

4.41 Interrogating Signal — The signal sent out by an interrogator.

4.42 Responsor — A unit which receives the response emitted by a transponder due to excitation by the interrogating signal.

4.43 Cross-Band Transponder — A transponder whose response is at a different frequency from that of the interrogating signal.

4.44 Corner Reflector — A reflector consisting of three flat surfaces intersecting mutually at right angles, and which reflects incident waves parallel to their direction of incidence.

4.45 Coherent Oscillator — In coherent pulse radar. An oscillator providing a reference by which the radio-frequency phase of a received pulse may be compared with the radio-frequency phase of a transmitted pulse, associated with the received pulse.

4.46 Modulator — In pulse radar. A device for generating a succession of short pulses of energy which cause a transmitter valve to oscillate during each pulse and to deliver r.f. power in the desired load.

4.47 Pulse Forming Line — An artificial line which stores energy from a direct or alternating current source and delivers it in the form of modulating pulses.

4.48 Triggered Spark-Gap — A spark-gap controlled by a voltage pulse.

4.49 Trigatron — A gas-filled tube with a spark-gap and a trigger electrode by which the discharge is initiated, sometimes used in radar modulators.

4.50 Display

a) Equipment of the visual presentation of the received signals in a radar set.

b) The visual presentation of received signals.

4.51 Meter Display — Display by means of an indicating instrument of the pointer or moving-mirror type.

4.52 Numerical Display — Display in the form of numbers.

4.53 Cathode-Ray Tube Display — The presentation of received signals on the screen of a cathode-ray tube.

4.54 Intensity Modulated Display — A cathode-ray tube display in which the video signal modulates the intensity of the electron beam so that the brilliance of the spot is a function of the strength of the echo.

NOTE — This type of a display is found in numerous equipments, for example, plan-position indicator (**4.60**), height-position indicator (**4.64**) and elevation-position indicator (**4.65**).

4.55 Range Bearing Display

a) A cathode-ray tube display on which echoes are presented in the form of spots whose position gives the direction of the targets with respect to a reference direction.

b) A cathode-ray tube display on which an echo is presented as two spots whose relative position gives certain information on the co-ordinates of the target.

4.56 Split Display — A method of presentation used in conjunction with beam switching in which the displayed echo on the cathode-ray tube undergoes a displacement in synchronism with the beam switching.

4.57 Range-Amplitude Display — A radar display in which a time-base provides the range scale on which echoes appear as deflections normal to the base. The amplitudes of the deflections depend on the strengths of the echoes.

4.58 Type 'A' Display — A range-amplitude display in which the time-base is sensibly a straight line.

4.59 Type 'B' Display — A radar display in which an echo appears on the screen as a bright spot whose rectangular co-ordinates indicate the range and bearing of the object.

4.60 Plan-Position Indicator (PPI) — An intensity-modulated radar display indicating, as on a map, the relative positions of echo-producing objects.

Note — In general, the centre of a PPI display corresponds to the position of the radar aerial.

4.61 Off-Centre Plan Display — A PPI display, the centre of which does not correspond to the position of the radar aerial.

4.62 Expanded-Centre Plan Display — A PPI display on which zero range corresponds to a ring round the centre of the display.

4.63 Sector Display — A display used with a radar set the aerial of which is continuously rotating. The screen, which is of long persistence type, is excited only while the beam of the aerial system is within a narrow section centred on a selected object.

Note — A sector display can be used in conjunction with, for example, a range amplitude display or a PPI.

4.64 Height-Position Indicator (HPI)/Range-Height Indicator — A radar device giving a display which shows the slant ranges and, on an exaggerated scale, the angular elevation of objects, from which the height can be directly read.

4.65 Elevation-Position Indicator (EPI) — A radar device giving a display which shows simultaneously the angular elevations (true to scale) and the slant ranges of objects.

4.66 Azimuth Stabilized PPI — A plan-position indicator in which the true north on the display remains fixed in spite of the movement of the ship or aircraft.

Note — The term is extended to stabilization with respect to magnetic north.

4.67 Skiatron/Dark Trace Tube — A form of cathode-ray tube in which the screen is designed to possess the property of darkening under the impact of an electron beam.

Note — The persistence of the trace depends on the temperature of the screen and can be modified by irradiation with light of suitable wavelengths.

4.68 Skiatron Display — A display using a skiatron.

4.69 Chart-Comparison Unit — An optical device to enable a radar PPI picture to appear superimposed on a navigational chart.

4.70 RF Envelope Indicator — A cathode-ray tube indicator showing the envelope of the radio-frequency signal transmitted by a pulse radar, and used as a transmitter monitor.

4.71 Instantaneous Automatic Gain Control (IAGC) — In radar. A quick action automatic gain control which does not respond to single echoes but which responds to variations of mean clutter level, so that clutter is reduced.

4.72 Anti-Clutter Gain Control/Sensitivity Time-Control — A device which automatically and smoothly increases the gain of a radar receiver from a low level to the maximum, within a certain period after each transmitter pulse, so that short-range echoes which may be unwanted are amplified less than long-range echoes.

4.73 Differentiation — A method of breaking up clutter by using the differentiating properties of filter circuits with high-pass frequency characteristics.

4.74 RF Head — In a radar set. A term used to refer loosely to the assemblage of radar frequency components (sometimes including the aerial system and usually including the head amplifier).

4.75 Radar Head — The RF head, together with the aerial and its feeder, when these are all in proximity.

4.76 Echo Box — A cavity resonator having small damping energized by pulses of the transmitted energy.

Note — Usually the train of diminishing oscillations in the box immediately following each transmitted pulse, is re-radiated to the radar receiver to provide an overall test of the radar set.

4.77 TR Tube — A gas filled tube which acts as a short-circuit when strongly ionized by high power radiation but is transparent to low power energy when feebly ionized.

Note — TR is derived from *transmit-receive.*

4.78 Keep-Alive Electrode — The electrode in a TR tube which is held at a high negative potential with a view to maintaining a permanent state of ionization in the tube.

4.79 Polyplexure — In radar. A system which combines the functions of a TR switch and beam switching.

4.80 Radar Relay/Radar Link — A system of reproducing at a distance the information from a radar set.

4.81 Target — In radar. An object about which information is sought with a radar equipment.

4.82 Electrical Distance — The representation of the range separating two points by the transit time of an electromagnetic wave from one point to the other.

4.83 Confusion Region — The region surrounding an object within which the radar echo from that object cannot be resolved from other echoes.

4.84 Radar Pulse — A pulse transmitted by a radar set.

4.85 Echoing Volume — The region in space within which the energy of a given pulse transmitted by a radar set is distributed at a given instant.

4.86 Ground Wave (in Radar) — The direct transference of radio-frequency energy from a radar transmitter to its associated receiver.

NOTE — The term is also used to describe the effect on the display of the transference of energy from the associated transmitter.

4.87 Ground Wave Suppression — Reduction of the gain of a receiver during the period in which the ground wave is present.

4.88 Echo — In radar.

a) The radio-frequency energy received after reflection from an object.

b) The effect of (a) on a radar display.

4.89 Stationary Echo — An echo from an object which is not moving relative to the radar set.

4.90 Permanent Echo — A stationary echo due to a permanent obstacle.

4.91 Ground Returns — Wanted echoes received from the ground by an airborne radar.

4.92 Land Returns — Wanted echoes received from the coastline by a ship-borne radar.

4.93 Sea Returns — Wanted echoes received from the surface of the sea by a radar set.

4.94 Unwanted Echo/Ghost — An unwanted echo from an object other than the target, or caused by a fault in the apparatus.

4.95 Parasitic Echo — An unwanted echo caused only by a fault in the apparatus.

4.96 Side Echo — The effect on the display produced by a side lobe of a radar aerial.

4.97 Back Echo — The effect on the display produced by a back lobe of a radar aerial.

4.98 Break — A lateral discontinuity in a range-amplitude display. In this sense, an alternative term for ‘ echo ’.

4.99 Grass — On a radar display. Deflection from the time-base of a range-amplitude display due to random electrical noise.

4.100 Snow — A speckled background on an intensity-modulated display due to random electrical noise.

4.101 Clutter — Confused unwanted echoes on a radar display.

4.102 Sea Clutter — Clutter caused by waves of the sea.

4.103 Performance Index — The quotient of the powers of the minimum detectable received pulse from an echo, and that of the transmitter pulse.

4.104 Visibility Factor — The quotient of the power of the minimum detectable signal with a hypothetical ideal display and that with the human operator using the actual display.

4.105 Echoing Area — In radar applications, of an object in a specified orientation. At the position of the object, the area normal to the direction of the radar transmitter, such that the power crossing it, if re-radiated equally in all directions, would provide at the radar receiving aerial the same power flux as that given by the object itself.

4.106 Symmetrical Target — A target whose echoing area is independent of the direction of the radar.

4.107 Illumination (of a Target) — The action of holding a beam from a radar set on a target.

4.108 Radar Equation — A mathematical equation which relates the transmitted and received powers and aerial gains of a primary radar to the echoing area and distance of an object.

4.109 Compound Target — A target formed of a large number of reflecting surfaces, disposed in a random manner, the whole assemblage occupying a volume having dimensions exceeding the illuminated volume.

4.110 Complex Target — A target formed of a large number of reflecting surfaces, the whole assemblage having dimensions less than the limits corresponding to the resolution capabilities of the radar.

4.111 Scintillation — A rapid displacement of a target echo about its mean position.

4.112 Shadow Region — The region from which, under normal propagation conditions the received filed strength is so reduced by some obstruction that effective radar detection of objects in this region is improbable.

4.113 Cancellation Ratio — The ratio of the echo voltages from the same fixed target when the device for eliminating permanent echoes is, and is not, functioning.

4.114 Sub-Clutter Visibility Factor — The ratio of the mean square value of the clutter power to the amplitude of the minimum discernible echo power when the device for eliminating permanent echoes is functioning.

4.115 Blind Speeds — The radial velocities of a target at which it can escape detection by a radar with a device for eliminating permanent echoes.

4.116 Jitter Effect — A form of jitter which affects the echo of a moving target when displayed on a Doppler radar.

4.117 To Expand — In radar. To spread out all or part of the scale of a time-base on a range-amplitude display.

4.118 Strobe Pulse

a) A pulse, of duration less than the period of a recurrent phenomenon, used for scrutinizing a particular epoch of that phenomenon.

NOTE — In radar, a strobe pulse is sometimes made to follow automatically the echo from a moving object.

b) The effect of (a) on the radar display.

4.119 To Strobe — To select a desired epoch of a recurrent phenomenon.

4.120 Walking Strobe Pulse — A strobe pulse whose timing is automatically varied between given limits.

4.121 Automatic Strobe Pulse — A strobe pulse whose timing is automatically adjusted to coincide with that of a given echo, even though the range of the corresponding target varies.

4.122 Strobe Marker — A small bright spot, or a short gap, or other discontinuity produced on the trace of a radar display to indicate that part of the time-base which is receiving attention.

4.123 Range Marker — A visual indication on a radar display for measuring the range or for calibrating the time-base.

4.124 Step-Strobe Marker — A form of strobe marker in which the discontinuity is in the form of a step in the time-base.

4.125 Well-Strobe Marker — A form of strobe marker in which the discontinuity is in the form of a rectangular depression in the time-base.

4.126 Calibration Marks — Reference marks produced on a display for the purpose of calibration or for measuring range.

4.127 Transponder/Trigger Limit/Minimum Trigger Signal in a Transponder — The minimum level of the input at the receiver of the transponder necessary to cause a response.

4.128 Transponder Reply Efficiency — The ratio of the number of responses emitted by a transponder to the number of valid interrogations received.

4.129 Dead Time (of a Transponder) — The minimum interval of time following a pulse during which a transponder is incapable of giving out a new signal.

4.130 Ringing Time — The time, reckoned from the end of a pulse transmitted by a radar set, during which the energy being returned by an echo box remains above that value required to produce a visible signal on the display.

4.131 Response Factor — The ratio of the number of interrogations received which are not followed by a response to the total number of interrogations received.

4.132 Paint (on a PPI Display)

a) To leave a picture on a long persistence screen by the effect of signals on the moving time-base.

b) The picture remaining.

5. RADIO-NAVIGATION

5.1 Radio-Navigation — The use of radio waves in navigation for the determination of position or direction, or for obstruction warning.

5.2 Instrument Navigation — A method of navigation in which a craft is steered entirely from instruments within the craft, without external visual observations.

5.3 Radio Guidance — A means of using radio remotes to control the motion of a craft or vehicle.

5.4 Radio Homing — Homing making use of radio apparatus, normally a transmitter, situated at the point to which the craft is to be steered.

5.5 Radio Track — The track followed by a craft under radio control.

5.6 Radio Control — The control of mechanism or other apparatus by radio waves.

5.7 Radio-Autocontrol — The radio control of an object by radio reference from itself to other objects.

5.8 Radio-Telecontrol — Radio control by radio waves emitted from a distant control point.

5.9 Track Guidance System — A system of radio-navigation which defines in space one or several surfaces, thus delimiting a number of distinguishable regions.

5.10 Signal Comparison Tracking — A system of radio-navigation using two signal transmissions in which some characteristic varies with position in accordance with two distinct laws, this characteristic having the same value for both signals on the surface defining the required track and unequal values elsewhere.

5.11 Interlocking Equi-Signal System — A system of radio-navigation by a comparison method in which two alternating transmissions are used which produce in the region of the surface defining the required track signals which are operationally complementary signals; on the track surface the resultant composite signal has a constant intensity.

5.12 Radio Alignment by Comparison/Radio Alignment Beam — The narrow solid angle within which the signals cannot be distinguished from those received on the surface defining the required track.

5.13 Radio Beacon — A radio transmitter whose radiations enable an aircraft to determine its own direction or position relative to the beacon by means of a suitable receiver or direction-finder.

5.14 Non-Directional Radio Beacon (NDB) — A radio beacon with a fixed omnidirectional aerial where bearing can only be determined by a craft equipped for direction finding.

5.15 Omnidirectional Radio Beacon — A directional radio beacon providing a service in all azimuths.

5.16 VHF Omni-Range Beacon — In aviation. A short range very-high-frequency, omnidirectional beacon which provides an indication in an aircraft of its bearing with respect to the beacon, or left-right track indication.

5.17 Rotating Beacon — A form of directional beacon in which the radiation pattern is made to rotate about the vertical axis.

5.18 Sector-Scanning Beacon — A form of directional beacon in which the radiation pattern oscillates about an axis, the latter usually being vertical.

5.19 Directional Radio Beacon — A transmitter whose emission is coded in such a way that a craft not equipped for direction finding can determine its bearing with respect to the beacon.

5.20 Racon — In marine use. A transponder used as a radar beacon to enable a craft to determine its position relative to the racon.

5.21 Ramark — A non-directional radio beacon (usually pulsed) used as a radar beacon to enable a craft to determine its direction relative to the ramark.

5.22 Track Beacon — A beacon providing a track.

5.23 Radio Range/Four-Course Beacon — A track beacon providing four tracks.

5.24 Consol Beacon — A continuous-wave, medium-frequency long range directional radio beacon producing a number of radial equi-signal zones which shift in azimuth at a fixed rate and are separated by zones of dot-and-dash signals. The bearing of the mobile station with respect to the beacon is determined by a count of the dot-and-dash signals within each respective zone.

5.25 Night Radio Beacon (Protected from Night Effects) — A radio beacon in which precautions have been taken to reduce polarization errors.

5.26 Low-Power Beacon — A short range omnidirectional radio beacon.

5.27 Beacon Channel Width — In marine use. The narrow angle, in a horizontal plane, within which the signals received cannot be distinguished from those corresponding to the required track.

5.28 Radio Compass — An automatic radio direction-finder, which indicates the bearing of the transmitter to which the receiver is tuned, with respect to a given direction, which is usually the fore-aft line of the aircraft.

5.29 Navigational Radar — Radar equipment installed on a craft as an aid to its navigation.

5.30 Surveillance Radar — A radio-navigational aid employing primary radar to display at a land station the position of craft within its range.

5.31 Radar Beacon — A fixed radio transmitter whose radiations enable a craft to determine its own direction or position relative to the beacon by means of its own radar equipment.

5.32 Radar Reflector — In radar. A passive reflector used to reflect radar transmissions.

5.33 Coded Radar Reflector — A radar reflector having reflecting properties which vary according to a specific code which gives an indication on the display of the radar receiver.

5.34 Pulsed Beacon — A device used in radio-navigation which transmits, either automatically or in response to a particular signal, a pulsed radio signal with specific characteristics.

5.35 Rebecca-Eureka System — In aviation. A secondary-radar homing and distance measuring system employing an airborne interrogating installation (Rebecca) and a ground responding beacon (Eureka).

5.36 H Radar Navigation System (H) — A radar navigating system comprising two separate fixed transponder stations interrogated by a transmitter in the craft, thus enabling the distance to each fixed station to be measured in the craft.

5.37 Shoran — An H radar navigation system used for precision position fixing.

NOTE — The term is derived from '*Short range navigation*'.

5.38 Tacan — A navigation aid, measuring distance and bearing from a transponder type directional beacon. The craft carries a pulsed interrogating transmitter, a receiver and display equipment. The combined receive-transmit radiation pattern of the beacon rotates continuously about a vertical axis and the phase-characteristics of the amplitude modulation so imposed on the transmitted pulses carries the bearing information.

NOTE 1 — The amplitude modulation comprises two components on harmonically related frequencies providing coarse and fine bearing accuracy. Reference signals for the phase measurements are provided by marker pulses transmitted by the beacon when its radiation pattern has particular orientations.

NOTE 2 — When not interrogated, random pulses as well as the markers are transmitted by the beacon which thus continues to provide a directional beacon service.

NOTE 3 — The term is derived from '*Ta*ctical *a*ir *n*avigation'.

5.39 Isochrone — A line (on a map or chart) joining points associated with a constant time difference in the reception of radio aid signals.

NOTE — Isochrones may, for example, be families of confocal ellipses or hyperbolae, depending on the arrangement of transmitters and receivers.

5.40 Pair — In radio-navigation. A pair of stations of a chain, usually a master and slave station.

5.41 Pattern — In hyperbolic navigation systems. The system of hyperbolic position lines associated with a single pair of stations, usually the master station and a slave station.

5.42 Hyperbolic Navigation System — Radio-navigation based on the measurement of the time differences in the reception of signals from several pairs of synchronized transmitters. For each pair of transmitters the isochrone lines are substantially hyperbolic and the combination of lines allows the position of the craft to be determined.

5.43 Master Station — In radio-nagivation. The station of a chain which provides a datum by which the transmission of the other (slave) stations is controlled.

5.44 Slave Station — In radio navigation. Any transmitting station of a chain, other than the master station.

5.45 Chain — In radio-navigation. A system of transmitters comprising a master station and a number of slave stations. A monitor station may also be included.

5.46 Base Line — In radio-navigation. The line directly joining two transmitting stations, usually the master station and a slave station.

5.47 Lattice — In hyperbolic navigation systems. The system of hyperbolic lines over-printed on a navigational chart for the purpose of position-fixing.

NOTE 1 — The term is sometimes used for 'Pattern', for example, 'Red lattice' for 'Red pattern'.

NOTE 2 — In the Decca Navigator system the lattice comprises red, green and purple patterns.

5.48 Loran — A medium or low frequency system of radio-navigation by which interrelated pulses transmitted from ground stations are received in a craft. The position of the craft can be determined by observing the interval between pulses from pairs of stations and plotting them on a special map.

NOTE — The term '**Loran**' is derived from *Long range navigation*.

5.49 'A' Station — In Loran. The designation applied to the transmitting station of a pair, the signal of which always occurs less than half a repetition period after the immediately preceding signal and more than half a repetition period before the immediately succeeding signal from the other station of the pair, designated as 'B' station.

5.50 'B' Station — In Loran. The designation applied to the transmitting station of a pair, the signal of which always occurs more than half a repetition period after the immediately preceding signal and less than half a repetition period before the immediately succeeding signal from the other station of the pair, designated as 'A' station.

5.51 Basic Repetition Rate — In Loran. The lowest pulse repetition rate of each of the two sets of close-spaced repetition rates employed in Loran.

5.52 Absolute Delay — In Loran the interval of time between the transmission of a signal from the 'A' station, and transmission of the next signal from the 'B' station.

5.53 Blinking — In pulse systems. A method of providing information by modifying the signal (at its source) so that the signal presentation on the display alternately appears and disappears; for example, in Loran, a means for indicating that a transmitting station is not operating correctly.

5.54 Gee — A VHF system of radio-navigation by which interrelated pulses transmitted from ground stations are received in a craft. The position of the craft can be determined by observing the interval between pulses from pairs of stations and plotting them on a map or navigational chart over-printed with the Gee lattice.

5.55 Decca Navigator System — A distributed arrangement of fixed, phase-locked, continuous wave transmitters operating on harmonically related frequencies, and the special receiving and display equipment carried on a mobile craft whereby the latter can determine its position. The system depends for its operation comparison frequency within the receiver. The master station also initiates timed switching of transmissions when required.

5.56 Decometer — A phase-meter used for the display of Decca position-line information within a pattern. The readings of a decometer and the lane-identification meter determine the position line on which the craft lies.

5.57 Referencing — The method, incorporated in Decca navigator receivers of checking and adjusting so that unwanted phase-shifts within the receiver are removed.

5.58 Zero-Isochrone — The locus of points at which there is zero time difference between associated signals sent out by synchronized transmitting stations.

5.59 Base Line Extension — In radio navigation. The extension of the base line beyond either station.

5.60 In-Phase Position Line — A line for all points on which the master and slave signals are in phase at the comparison frequency.

5.61 Lane — In a Decca navigator system. The space on a pattern bounded by two hyperbolic in-phase position lines between which the phase relationship of master and slave signals at the comparison frequency ranges over 360 degrees.

5.62 Zone — In the Decca navigator system. A group of a specified number of adjacent lanes.

5.63 Lane-Identification — The automatic system incorporated in the Decca navigator system to identify the particular lane in a pattern in which the craft is situated.

5.64 Lane-Identification Meter — In the Decca navigator system. The phase-meter used to display automatically lane-identification information.

5.65 Controlled Airspace — An airspace of defined dimensions within which Air-traffic Control Service is provided to aircraft.

5.66 Marker Beacon — In aviation. A radio beacon which radiates a signal to define an area above the beacon.

5.67 Fan Marker Beacon — In aviation. A form of marker beacon radiating a vertical fan-shaped pattern.

5.68 En Route Marker Beacon — A fan marker beacon positioned along an aerial route, and having a vertical beam in the form of a cone with horizontal cross-section very elongated in a direction perpendicular to the route and very narrow along the direction of that route.

5.69 Z Marker Beacon — In aviation. A form of marker beacon radiating a narrow conical beam along the vertical axis of the cone of silence of a track beacon.

5.70 Panoramic Radar — A radar set with a PPI display.

Example:

Warning radar.

5.71 **Aerodrome Surface Movement Indicator (ASMI)** — In aviation. A primary radar system displaying at a control point on an aerodrome all fixed or moving objects above a certain size on the runway and taxying surfaces.

5.72 **Weather Radar (Airborne)/Cloud and Collision Warning System** — A primary radar equipment in an aircraft providing, usually by a cathode-ray tube display, indication of the position of potentially dangerous clouds, other aircraft, or high ground in its path.

5.73 **Terrain Clearance Warning Indicator** — An airborne radio-navigational device giving a warning signal when the clearance between the aircraft and the earth immediately below reaches a predetermined minimum value.

5.74 **Radio Altimeter** — Radio equipment which indicates the distance between an aircraft and the surface vertically below.

5.75 **Distance Measuring Equipment (DME)** — An airborne secondary radar equipment which, when used in conjunction with a ground transponder beacon, indicates its distance from the beacon.

5.76 **Approach** — The whole series of manoeuvres carried out by a pilot when preparing to land on an aerodrome.

5.77 **Holding Point** — A point, identified by a radio beacon, or other navigational aid around which a holding manoeuvre is executed.

5.78 **Holding Pattern or Holding Track** — The flight track an aircraft is directed to follow at a holding point.

5.79 **Approach Control Radar (ACR)** — In aviation. A type of surveillance radar displaying at an aerodrome the positions of aircraft within its range.

5.80 **Beam Approach Beacon System** — A secondary radar system of radio-navigation which provides to an aircraft, during its approach, lateral guidance and distance from the optimum point of landing.

5.81 **Funnel** — A corridor or channel extending beyond take off and landing points of single strip on an aerodrome.

5.82 **Gate** — The point, identified by a radio beacon, from which the final approach is commenced.

5.83 **Visual Contact Approach** — An approach carried out by visual reference to the ground.

5.84 **Instrument Approach** — The technique of making an approach on a predetermined path defined by the emission from a ground radio-navigational aid system.

5.85 Initial Approach — That part of an approach procedure consisting of first approach to the first navigation facility associated with the procedure, or to the predetermined fix.

5.86 Intermediate Approach — That part of an approach procedure from the first arrival at the first navigation facility or predetermined fix to the beginning of the final approach.

5.87 Final Approach — That part of an approach procedure from the time the aircraft has completed the last turn into landing or has crossed a specified position to the point where a landing can be made.

5.88 Missed-Approach Procedure — Procedure to be followed when an aircraft cannot complete its final approach.

5.89 Holding — A prearranged manoeuvre carried out by a pilot when instructed to remain in a specified vicinity in the air while awaiting fresh instructions.

5.90 Ground-Controlled Approach System (GCA) — A system of radio-navigation comprising surveillance radar element (SRE) and a precision approach radar (PAR) element for the operation of a ground-controlled approach.

5.91 Surveillance Radar Element (SRE) — An element of the ground-controlled approach system using primary radar to establish distance and azimuth of all aircraft within its range, so that controlled aircraft can be directed on to the approach path.

5.92 Precision Approach-Radar (PAR) — A device using primary radar to determine accurately the position of an aircraft during its approach relative to the predetermined approach path. When used as an element of the ground-controlled approach system, it is known as a ' precision approach radar element '.

5.93 Instrument Landing System (ILS) — A radio-navigation system which provides an aircraft with horizontal and vertical guidance just before and during landing, and, at certain fixed point, indicates the distance to the reference point of landing.

5.94 Localizer Beacon — In aviation. A directional radio beacon, associated with the instrument landing system, which provides an aircraft, during approach and landing, with an indication of its lateral position relative to the runway in use.

NOTE — When a beacon having a similar function is used as part of the standard beam approach system (SBA) it is called an ' Approach beacon '.

5.95 Glide-Path Beacon — A directional radio beacon, associated with an instrument landing system which provides an aircraft, during approach and landing, with indications of its vertical position relative to the desired approach path.

5.96 Outer Marker Beacon — A marker beacon, associated with the instrument landing system or the standard approach system, which defines the first predetermined point during a beam approach.

5.97 Middle Marker Beacon — A marker beacon, associated with the instrument landing system, used to define the second predetermined point during a beam approach.

5.98 Inner Marker Beacon — A marker beacon, associated with the instrument landing system or the standard beam approach system, used to define the final predetermined point during a beam approach and indicating the proximity of the aerodrome boundary.

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NOTE — This index has been prepared in accordance with IS : 1275-1958*. Index numbers are clause numbers.

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